

WHAT IS CLAIMED IS:

1. A semiconductor device comprising a substrate, a land formed on the substrate, a semiconductor chip mounted on the land, a solder layer only through which the semiconductor chip is joined with the land, and a synthetic resin covering the land, the solder layer and the semiconductor chip on the substrate.

2. The semiconductor device as set forth in Claim 1, wherein a coefficient of expansion of the synthetic resin is generally less than a coefficient of expansion of the substrate or a coefficient of expansion of the land.

3. The semiconductor device as set forth in Claim 1, wherein the substrate comprises aluminum.

4. The semiconductor device as set forth in Claim 3, wherein a coefficient of expansion of the synthetic resin is generally less than a coefficient of expansion of aluminum.

5. The semiconductor device as set forth in Claim 4, wherein the coefficient of the linear expansion of the synthetic resin is generally less than approximately 23 ppm/°K.

6. The semiconductor device as set forth in Claim 3, wherein the land comprises copper.

7. The semiconductor device as set forth in Claim 3, wherein the synthetic resin includes epoxide.

8. The semiconductor as set forth in Claim 1, wherein a coefficient of expansion of the synthetic resin is generally less than one of a coefficient of expansion of the substrate and a coefficient of expansion of the land, and is generally greater than the other one of the coefficient of expansion of the substrate and the coefficient of expansion of the land.

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9. The semiconductor as set forth in Claim 8, wherein the coefficient of expansion of the synthetic resin is less than the coefficient of expansion of the substrate and is greater than the coefficient of expansion of the land.

10. The semiconductor as set forth in Claim 8, wherein the coefficient of expansion of the synthetic resin is less than the coefficient of expansion of the land and is greater than the coefficient of expansion of the substrate.

11. The semiconductor as set forth in Claim 8, wherein the substrate comprises aluminum.

12. The semiconductor device as set forth in Claim 11, wherein the coefficient of the expansion of the synthetic resin is generally less than a coefficient of expansion of aluminum.

13. The semiconductor device as set forth in Claim 1, wherein the semiconductor chip defines at least two corners positioned generally opposite to each other, the land defines at least two corners in proximity to the corners of the semiconductor chip, and the corners of the land generally confine the corners of the semiconductor chip therein.

14. The semiconductor device as set forth in Claim 1, wherein the semiconductor chip controls electric power.

15. The semiconductor device as set forth in Claim 14, wherein the semiconductor chip controls power of an electric motor arranged to drive an electric vehicle.

16. A semiconductor device comprising a substrate, a land formed on the substrate, a semiconductor chip mounted on the land, a solder layer joining the semiconductor chip with the land, the semiconductor chip defining at least two corners positioned generally opposite to each other, the land defining at least two corners disposed in proximity to the corners of the semiconductor chip, the corners of the land generally confining the corners of the semiconductor chip therein.

17. The semiconductor device as set forth in Claim 16, wherein the corners of the land are the closest portions to the corners of the semiconductor chip.

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18. The semiconductor device as set forth in Claim 16, wherein the semiconductor chip is generally configured as a rectangular shape, and the corners of the semiconductor chip are positioned on a diagonal line of the rectangular shape.

19. The semiconductor device as set forth in Claim 18, wherein the semiconductor chip defines four corners, and the land defines four corners corresponding to the corners of the semiconductor chip.

20. The semiconductor device as set forth in Claim 18, wherein at least a length of a shorter side of the rectangular shape is longer than approximately 2.5 millimeters.

21. The semiconductor device as set forth in Claim 16, wherein the land is generally configured as a rectangular shape except for the corners.

22. The semiconductor device as set forth in Claim 16, wherein the land is generally configured as a round shape except for the corners.

23. The semiconductor as set forth in Claim 16, wherein an area of the land is larger than an area of the semiconductor chip, and the area of the land generally shrinks toward the corners of the semiconductor chip.

24. The semiconductor as set forth in Claim 16, wherein an area of the land is larger than an area of the semiconductor chip, and the area of the land generally expands from the corners of the semiconductor chip.

25. The semiconductor device as set forth in Claim 16, wherein the semiconductor chip controls electric power.

26. The semiconductor device as set forth in Claim 16, wherein the semiconductor chip is joined with the land in a reflow soldering method.

27. A method for joining a semiconductor chip to a substrate comprising forming a land on the substrate, soldering the semiconductor chip directly to the land, and covering the land and the semiconductor chip with a synthetic resin.

28. The method as set forth in Claim 27, wherein a coefficient of expansion of the synthetic resin is set generally less than a coefficient of expansion of the substrate or a coefficient of expansion of a land.

29. The method as set forth in Claim 27, wherein a coefficient of expansion of the synthetic resin is set generally less than one of a coefficient of expansion of the substrate or a coefficient of expansion of the land and is generally greater than the other one of the coefficient of expansion of the substrate or the coefficient of expansion of the land.

30. The method as set forth in Claim 29, wherein the coefficient of expansion of the synthetic resin is less than the coefficient of expansion of the substrate and is greater than the coefficient of expansion of the land.

31. The method as set forth in Claim 29, wherein the coefficient of expansion of the synthetic resin is less than the coefficient of expansion of the land and is greater than the coefficient of expansion of the substrate.

32. The method as set forth in Claim 27 additionally comprising forming positioning portions for the semiconductor chip on the land, and positioning the semiconductor chip at the positioning portions.